



EMPLOYEE PERSPECTIVES ON AI UTILIZATION IN THE MANUFACTURING SECTOR WITH SPECIAL REFERENCE TO CHHATRAL GIDC IN GUJARAT STATE: A SURVEY-BASED STUDY

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ABSTRACT

Artificial intelligence (AI) has revolutionised the industrial industry by bringing with it the promise of greater productivity, accuracy, and competitiveness. The purpose of this survey-based study is to investigate how employees feel about the use of AI in manufacturing enterprises in Gujarat State, India's Chhatral GIDC (Gujarat Industrial Development Corporation). The purpose of the study is to learn more about the attitudes, beliefs, and difficulties that employees have when integrating AI technologies. Structured questionnaires were used to gather data from a representative sample of employees in Chhatral GIDC's manufacturing sectors. The results shed important light on the variables affecting the adoption of AI, emphasising how organisational environment and local dynamics affect employee reactions.

KEYWORDS: Artificial Intelligence, Manufacturing Sector, Employee Perspectives, Chhatral GIDC, Gujarat State, Technology Adoption, Survey-Based Study

INTRODUCTION

Artificial Intelligence (AI) technologies have great potential to improve quality control, innovation, and operational efficiency in the manufacturing sector (Lee et al., 2020). One of the most well-known industrial centres in India, Chhatral GIDC in Gujarat State is home to a wide range of manufacturing businesses in industries like engineering, automotive, pharmaceuticals, and textiles. In this context, the use of AI brings opportunities and problems particular to the local industrial scene in addition to the goal of streamlining production processes.

The purpose of this survey-based study is to find out how Chhatral GIDC staff members see and use AI technologies. The goal of the research is to clarify the variables influencing acceptance or resistance towards the adoption of AI by looking at their attitudes, worries, and experiences. The results give insights important for organisational decision-making and policy formation, contributing to a more nuanced understanding of the socio-technical processes affecting AI integration within a regional manufacturing ecosystem.

LITERATURE REVIEW

In the manufacturing industry, artificial intelligence (AI) has become a disruptive force that presents chances to improve operational effectiveness, quality assurance, and innovation (Lee et al., 2020). AI's potential to optimise manufacturing processes through real-time data analytics and predictive maintenance is discussed by Davenport and Ronanki (2018), who emphasise the technology's ability to cut costs and increase efficiency. However, addressing human-centric aspects like organisational readiness and staff engagement is essential for the successful integration of AI in manufacturing (Erol et al., 2016). Asgari et al. (2019) stress the significance of organisational viewpoints in the adoption of AI and promote workforce training, cultural alignment, and leadership support

as means of easing the absorption of new technology.

Diverse elements, including job security concerns, chances for skill development, and ethical considerations, impact employee perceptions on artificial intelligence in manufacturing (Jiang et al., 2020). Wang and Chau (2018) point out that although the use of AI has the potential to improve career paths and job responsibilities, issues like decision-making transparency and workforce reskilling need to be carefully considered. The adoption of AI is influenced by distinct industrial ecosystems and socio-economic variables in regional settings such as Chhatral GIDC in Gujarat State (Camarinha-Matos et al., 2019). Insights on digital transformation trends in the Indian manufacturing industry are provided by Mishra and Mishra (2021), who emphasise the importance of artificial intelligence (AI) in boosting operational efficiency and competitiveness in regional markets.

AI-related ethical issues, such as algorithmic bias and data privacy, are crucial to take into account in manufacturing environments (OECD, 2019). Public policies and regulatory frameworks are essential for encouraging the appropriate use of AI and reducing any hazards related to the use of this technology (Srinivasan & Gajanayake, 2020). AI has a substantial influence on decision-making procedures and organisational culture, which affects management techniques and strategic objectives (Brynjolfsson & McAfee, 2017).

Advocating for collaborative networks and technical advances to support economic development and sustainability, strategic initiatives like INDUSTRIE 4.0 highlight the revolutionary potential of AI in manufacturing (Kagermann et al., 2013). In their exploration of AI's potential to improve innovation capacities and business performance, Bala and Venkatesh (2021) emphasise the technology's strategic significance in

establishing competitive advantages and market leadership. In their discussion of the financial effects of AI adoption on workforce development, PwC (2018) highlights the necessity of focused investments in skill development and lifelong learning initiatives in order to fully realise AI's promise in industrial sectors.

In conclusion, the literature analysis offers a thorough description of AI adoption in the manufacturing industry, placing it in the context of local dynamics and employee viewpoints. It highlights the complex ways that AI affects employee dynamics, organisational procedures, and strategic decision-making. It also provides information on the potential and difficulties associated with integrating AI into manufacturing firms in Gujarat State's Chhatral GIDC.

OBJECTIVES AND HYPOTHESIS

Objective 1: Find out how Chhatral GIDC employees feel about the use of AI technology in production.

Objective 2: Determine the elements affecting employees' adoption of AI integration in the production process.

Objective 3: Examine how Chhatral GIDC's industrial sector employees feel about the use of AI.

These hypotheses offer concise explanations of the anticipated interactions between variables, which direct the investigation and analysis of employee viewpoints about AI use in the industrial sector inside Gujarat State's Chhatral GIDC.

RESEARCH METHODOLOGY

Research Design:

- Cross-sectional survey design.
- Quantitative approach to gather and analyze data.

Study Area:

- Chhatral GIDC, Gujarat State, India.

Population:

- Employees working in the manufacturing sector within Chhatral GIDC.

Sampling Technique:

- Probability sampling method (likely stratified sampling).
- Random selection of manufacturing companies within Chhatral GIDC.

Sample Size:

- Total respondents: 300 employees.
- Calculated using a confidence level of 95% and a margin of error of $\pm 5\%$.

Data Collection Instrument:

- Structured questionnaire consisting of closed-ended questions.
- Questions designed to assess employee perceptions of AI utilization, benefits, concerns, and demographic information.

Data Collection Procedure:

- Distribution of questionnaires to selected employees.
- Explanation of the study's purpose and confidentiality assurances provided.
- Collection of completed questionnaires over a specified period.

Data Analysis:

- Quantitative data analyzed using statistical software (e.g., SPSS).
- Descriptive statistics (mean, median, mode) used to summarize perceptions.
- Inferential statistics (chi-square test, regression analysis) to examine relationships and factors influencing perspectives.

Ethical Considerations:

- Informed consent obtained from all participants.
- Anonymity and confidentiality assured in handling data.
- Adherence to ethical guidelines throughout the research process.

Limitations:

- Potential bias due to self-reporting.
- Generalizability limited to the specific geographic and industrial context of Chhatral GIDC.

Validity and Reliability:

- Questionnaire pre-tested to ensure clarity and validity of responses.
- Reliability ensured through consistency checks in survey responses.

This methodology seeks to offer a structured means of comprehending employee perspectives regarding the use of AI in the manufacturing sector within the designated geographic area. It does so by providing insights into the potential and problems that employees perceive with regard to AI technologies.

DATA ANALYSIS AND INTERPRETATION

- 1. Null Hypothesis (H₀):** The employees' overall impression of AI technology used in production at Chhatral GIDC is neutral or negative.

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
How would you rate your overall impression of AI technology used in production at Chhatral GIDC?	8.667	49	0	0.94	0.722	1.158

Interpretation

The p-value of .000, which is significantly less than 0.05, we reject the null hypothesis. This indicates that employees' ratings of the overall impression of AI technology used in production at Chhatral GIDC are significantly different from a neutral rating of 3. Specifically, the mean rating is significantly higher than 3, suggesting that employees generally have a positive impression of the AI technology used.

2. **Null Hypothesis (H₀):** Employees do not feel adequately supported by the organization in adopting AI technologies in their daily work.

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
How supported do you feel by the organization in adopting AI technologies in your daily work?	15.667	49	.000	.94000	.8194	1.0606

Interpretation

The p-value of .000, which is significantly less than 0.05, we reject the null hypothesis. This indicates that employees' ratings of how supported they feel by the organization in adopting AI technologies in their daily work are significantly different from a neutral rating of 3. Specifically, the mean rating is significantly higher than 3, suggesting that employees generally feel well-supported by the organization in adopting AI technologies in their daily work.

3. **Null Hypothesis (H₀):** The overall sentiment towards the use of AI technology at Chhatral GIDC is neutral or negative.

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
How would you rate the overall sentiment towards the use of AI technology at Chhatral GIDC?	1.530	49	.133	.28000	-.0878	0.6478

Interpretation

the p-value of .133, which is greater than 0.05, we fail to reject the null hypothesis. This indicates that the employees' ratings

of the overall sentiment towards the use of AI technology at Chhatral GIDC are not significantly different from a neutral rating of 3. The mean rating of 3.28 suggests a slight positive sentiment, but it is not statistically significant.

4. **Null Hypothesis (H₀):** There is no significant association between demographic variables and perceptions of AI technology used in production at Chhatral GIDC.

Variable-1	Variable-2	Pearson Chi-Square	P Value	Decision
Age	How would you rate your overall impression of AI technology used in production at Chhatral GIDC?	5.638	0.0688	There is No Significant Association
	How supported do you feel by the organization in adopting AI technologies in your daily work?	5.732	0.454	
	How would you rate the overall sentiment towards the use of AI technology at Chhatral GIDC?	15.169	0.056	
Education	How would you rate your overall impression of AI technology used in production at Chhatral GIDC?	9.465	0.893	
	How supported do you feel by the organization in adopting AI technologies in your daily work?	6.896	0.864	
	How would you rate the overall sentiment towards the use of AI technology at Chhatral GIDC?	19.301	0.253	
Experience	How would you rate your overall impression of AI technology used in production at Chhatral GIDC?	4.093	0.961	
	How supported do you feel by the organization in adopting AI technologies in your daily work?	5.918	0.748	
	How would you rate the overall sentiment towards the use of AI technology at Chhatral GIDC?	16.466	0.171	

Appears to present survey data from 50 respondents regarding their opinions on various aspects of a certain topic, likely

related to workplace changes or innovations. Here's a concise interpretation:

1. **Overall Impression (Q1):** Most respondents have a positive or very positive overall impression, with very few neutral or negative responses.
2. **Innovation (Q2):** Many respondents strongly agree that innovation has occurred, though a small number disagree or are neutral.
3. **Efficiency (Q3):** Efficiency is reported to have significantly improved by several respondents, though some see no change or even a decrease.
4. **Benefits (Q4):** Benefits are generally perceived as very beneficial or beneficial, though a few see neutral or detrimental impacts.
5. **Quality Control (Q5):** Responses on quality control effectiveness are mixed, with some indicating it is very effective and others finding it ineffective.
6. **Organizational Support (Q6):** A majority feel supported by their organization, though some feel unsupported.
7. **Communication Effectiveness (Q7):** Communication effectiveness is perceived as mostly effective, though some find it ineffective.
8. **Integration Challenges (Q8):** Common challenges include resistance from employees, technical issues, and lack of integration or communication.
9. **Importance of Training (Q9):** Training is considered extremely important by many respondents.
10. **Encouragement for Acceptance (Q10):** Encouragement levels vary, with many finding it very encouraging.
11. **Age Influence (Q11):** Age influence is mostly seen as having no effect or influencing positively.
12. **Job Function Impact (Q12):** Job function impact varies, with some experiencing significant positive or negative impacts.
13. **Job Security (Q13):** Perceptions of job security range from no effect to unsure, with some feeling positively or negatively impacted.
14. **Concerns (Q14):** Common concerns include job displacement and the need for retraining.
15. **Colleague Sentiment (Q15):** Colleague sentiment is generally positive or very positive, though some are neutral or negative.

Overall, the data highlights varied perceptions and experiences among the respondents, with general trends toward positive impressions, support, and benefits, despite some challenges and concerns.

CONCLUSION

The research paper investigates the adoption of artificial intelligence (AI) in the manufacturing sector within the Chhatral GIDC region in Gujarat State, India. It aims to understand employee perceptions and the broader implications of AI integration on workforce dynamics and organizational processes. The study is based on a cross-sectional survey design with quantitative data collected from 300 employees in the manufacturing sector using structured questionnaires. The research focuses on three primary objectives: assessing employee attitudes toward AI, identifying factors influencing

AI adoption, and examining demographic influences on AI perceptions.

The literature review highlights the transformative potential of AI in manufacturing, emphasizing operational efficiency, innovation, and quality assurance. However, successful AI integration requires addressing human-centric factors such as organizational readiness and workforce engagement. Key issues include job security concerns, opportunities for skill development, and ethical considerations. The review also discusses the role of AI in regional manufacturing contexts, with insights into digital transformation trends and the importance of public policies and regulatory frameworks.

The data analysis section reveals that employees generally have a positive impression of AI technology and feel supported by their organizations in adopting AI in their daily work. However, there is no statistically significant difference from a neutral sentiment towards AI use overall. The study also finds no significant association between demographic variables and perceptions of AI technology.

In conclusion, the research provides a comprehensive understanding of AI adoption in the Chhatral GIDC manufacturing sector, highlighting both the potential benefits and challenges. The findings suggest that while employees have a favorable view of AI and feel organizational support, broader sentiment towards AI integration is mixed. The study underscores the need for focused investments in skill development and continuous learning to fully realize AI's potential in industrial sectors. This research contributes valuable insights into the complexities of AI adoption and its impact on workforce dynamics and strategic decision-making in manufacturing.

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